

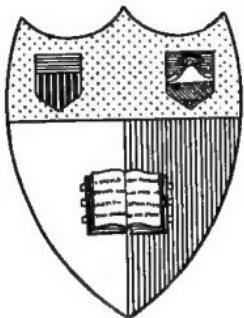
HOME PROJECT SERIES

VEGETABLE GARDENING
AND CANNING

NOLAN AND GREENE



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VEGETABLE GARDENING AND CANNING

A MANUAL FOR GARDEN CLUBS

BY

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INTRODUCTION

To THE PUPILS

If there has ever been need for garden clubs, individual gardens, and gardens of every sort, it is now when the cost of produce of all kinds has soared almost out of our reach, not only because of its scarcity, but because of the increased demand abroad as well. There is not space here to tell you why this is so, but the fact remains that if we would do ourselves, our families, our communities, and our nation one of the greatest possible services, we will find some plot available for gardening and then do our best to win from it what people call a bumper crop.

If I were to ask you what are some of the material, or practical advantages of gardening, you would say the food obtained, the healthfulness of outdoor work, and the financial returns from that portion of the crop which was marketed. Your answer would be only partially correct. That is to say, you are right as far as you go, but you do not go far enough. There are several other things which the gardener gets along with his hardening muscles, fresh vegetables, and increasing bank account. I shall not anticipate by telling them all for I want you to find them for yourselves, but one is the satisfaction that comes from seeing things develop under one's care; another is the acquaintance you form with plants, and the knowledge you acquire regarding their peculiarities of growth, their likes and

dislikes as to food and care; still another is the quickening of your powers of observation. These are the gains from garden work that will remain to enrich your lives long after the vegetables are eaten, or sold, and the money is spent which you made by marketing your crops.

In club gardening still other advantages are gained, the most important of which is undoubtedly the *ability to do team work*. Some of us who can do very good work alone, have never learned *to pull together*. The garden club cannot be a complete success unless its members are willing to join hands in an effort to make theirs the best gardens in the country. If this spirit prevails throughout all the garden ventures, then there will be a great number of successful gardens. But if by some strange mischance no crop at all should result, the fact that you had learned to work together would be a fine reward to you. What I mean is this: aside from the great value of the crop which your gardens will produce, is that equally great moral value, which some of us do not yet realize, of having learned to pull together.

With all these advantages in prospect, you must not forget this certain principle that here as elsewhere one does not "get something for nothing." Whether it is the crop of vegetables, the bank account, or the moral and physical training (or all combined), which you are after, there must be work and plenty of it to insure worth-while returns. But it must be intelligent effort, not haphazard manual labor, for physical labor that is not directed by mental effort will be disappointing to all concerned. One can work, and work hard, and yet deserve no particular credit and win no worthy reward, if he has worked blindly and without fixing upon his goal before he started for it.

Suppose a man desired to drive from Chicago to St. Louis, he would assuredly not start without ascertaining at least in which direction St. Louis lies, or better still, he would get a road map, or failing in that he would consult some one who had previously made the trip. Yet there are many people who, having a piece of ground which might make a profitable garden, will cultivate it carelessly, put the seeds in without reference to the best results to be obtained, and then think that the few radishes, cabbages, or other vegetables which luck lets them harvest, are all there is to gardening, and that "it doesn't pay."

Some one in writing of gardens not long ago said, "One must work the soil with brains as well as brawn." This is why I have just reminded you that intelligent planning must go hand in hand with manual endeavor. If this is so, after the garden club is organized, and it wants to know "What next?", the answer should be, "A suitable plot, a workable plan, good tools, and lots of muscle."

One may garden for pleasure, or for profit, but the garden club seems to make it possible to secure both results.

"The best thing school gardening does for young people is to help prepare them for their larger life in the world."—D. WILLIAMS.

J. C. BLAIR

Head of Department of Horticulture,
University of Illinois

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PART ONE

GARDEN PROJECT CALENDAR

JANUARY

1. Organization of the garden club. (See plans in the appendix.) The class in agriculture probably will not find it practical to organize the garden club project until this month. Each member of the class should become a member of the garden club and plan to do all the work outlined for the project. The plan should receive the hearty cooperation of the pupils, teacher, parents, and board of education. The state club leader at the State College of Agriculture should be notified of the organization of the club so that he can send enrollment blanks and all such literature and publications as will be helpful in the progress of the work.

2. Selecting the garden. The first thing each pupil should do after the organization of the club is to select the ground upon which he is to grow his garden the coming season. A garden plot not less than ten by thirty feet should be chosen for this project. A good, well drained, sandy loam, fertile soil with a sunny exposure should be chosen for the garden.

3. Fertilizing the garden. If the garden spot has not already been manured or otherwise fertilized, this matter may be attended to now. Well rotted farm manure at the rate of ten tons or more per acre should be applied upon the plot, to be plowed under as soon as the ground is dried out in the spring.

4. Notebook work. Each pupil should keep a neat and accurate record of all operations, results and accounts on the record pages provided at the end of this book, so that when the project is completed the pupil will have an agricultural booklet he will be proud to exhibit. Throughout the notebook work, pictures from catalogs and farm papers may be pasted in or sketched as the tastes and abilities of the pupil incline. Suggestions for the notebook work will be made in this calendar.

5. Clippings and pictures. Begin making clippings from farm papers, catalogs, and other available sources of pictures and of interesting garden articles for later use in your notebook and class-room work.

FEBRUARY

1. Make a plan of the garden. On the page of your agricultural notebook set apart for that purpose draw a neat, careful plan of your garden plot. Draw it to scale. Indicate the rows of vegetables you expect to plant by dotted lines for first plantings and full lines for later plantings. Make your drawing plan show distance of rows apart and distances of plants in the rows.

2. Catalog studies. Send for seed catalogs and study them as to prices and varieties of vegetables. Decide upon the vegetables and the varieties you are going to plant. List these in your notebook. Later in the month, if you plan to send to a seed house, you should make out your order so as to get the seeds in plenty of time. It is nearly always possible to get good seeds of a local dealer. Use only standard varieties adapted to the locality.

3. **Seed testing.** Make tests of small seeds. Study the per cent of germination. See practical exercises for details.

4. **Garden implements.** Study garden implement catalogs. Learn to identify garden implements and to know their uses. List the implements you have at home for garden work. Go over your home implements, clean, oil, and sharpen them up for the spring work.

5. **The signboard.** Each member of the class should make and letter a signboard to be placed in the garden or at some place on the home grounds where it may be seen if the garden is not by a road or street. This signboard should be 12 by 18 inches, planed on one side. It should bear the name of the local club preceded by the word "Member," as—



The lettering may be done by means of a stencil cut from cardboard. The letters may be cut from advertisements or made by some member of the class. These are then laid on the cardboard, their outline drawn with a pencil, and the letters cut out. The signboard may then be painted white, and the letters black.

MARCH

1. **Make a hot-bed.** See details of construction given in the practical exercises. Every pupil carrying on a garden project should make and care for a hot-

bed, in order to get the experience as well as the practical returns in early seedlings.



1. A HOT-BED AT SCHOOL

2. Flats. Construct "flats" 3x16x22 inches, and fill them with prepared sandy loam soil. At least two flats for each pupil should be made. Sow seeds of head lettuce and cabbage in one and celery seed in the other. Keep these flats moistened and in a warm room until ready for the transplanting of the seedlings.

3. Plowing the garden. If the weather permits and the ground is dried out sufficiently, the garden plot may be spaded up or plowed this month. If the manure has not already been applied as suggested for January, well rotted farm manure should be spread before plowing. If the soil is a stiff clay, it may be improved by the addition of sand. Plow deeply, covering all crop residue and manure.

4. Testing for soil acidity. Apply strips of blue litmus paper to moistened lumps of the garden soil. If the paper turns pink or red, the soil is sour and needs lime. Apply over the plowed surface air-slacked lime at the rate of a ton per acre.

5. Seed bed preparation. After plowing the ground,

it should be harrowed and re-harrowed until the soil is crumbled into as fine a seed bed as it is possible to make. Bone meal at the rate of 300 pounds per acre may be sown broadcast over the ground as a fertilizer, and be harrowed into the soil.

6. Preparation for planting. Mark off the rows according to the plan of seeding shown on your garden plan, and prepare to plant the seeds of some of the earlier vegetables. (See planting table given under the discussion.)

APRIL

1. Planting. If a rain should beat down the plowed soil of the garden before planting can be done, the ground should be thoroughly harrowed again, and put in good "onion tilth" before seeding. For middle latitudes, during this month, plant onion sets, radishes, spinach, lettuce, peas, beets, carrots, parsnips, turnips, potatoes, and early sweet corn. See directions in discussions and tables given later for details of planting vegetables. Directions are also given on seed packages purchased. Firm the earth well over all seeds planted. Record every operation done under the proper heading in the notebook.

2. Transplanting. Transplant cabbages and head lettuce from flats to the garden. Shift tomatoes from hot-bed to cold frame. Shift celery seedlings to small flats 2x2 inches. These flats may be placed in cold frames.

3. Cultivation. Cultivate with a wheel hoe and hand hoe all crops that have come up. Keep the un-planted portion of the garden harrowed.

4. Flowers. It would be well to sow seeds of some annual flowers about the borders of the garden, such

as petunias, four-o'clocks, cosmos, dwarf sunflowers, zinnias, etc.

MAY

1. Care and cultivation. Real work begins in the garden now. Pests will come and weeds will grow. The first thing that needs attention after seeding will be the weeds. It may be necessary to pull many weeds by hand, but whether by hand or hoe, the weeds must go. A loose, shallow soil mulch should be maintained at all times. The best tool for cultivation is a wheel hoe. It will usually be necessary to use the common hand hoe to put on the finishing touches. As soon after a rain as the ground is pliable and mellow the soil mulch should be provided.



2. A GARDEN CLUB

2. Planting. Plant beans, sweet corn, cucumbers, melons, squash and pumpkin. Follow directions given in planting tables, as to varieties and methods of planting.

3. Transplanting. Transplant cabbage, tomatoes,

and celery to the garden rows. Bed sweet potatoes for slips in the hot-bed.

4. **Thinning.** Where some of the plants are growing too thickly, it will be necessary to thin them out. Thin and weed onions, beets, carrots, parsnips, etc.

5. **Harvesting.** Harvest radishes, leaf lettuce, bunch onions, spinach, and peas.

6. **Bookkeeping.** Do not fail to record all garden business and work under the proper headings in your notebook.



3. A MAN'S JOB

JUNE AND JULY

1. **Cultivation.** See directions under (1) given for May.

2. **Insect pests.** Combating insect pests will be an early problem.

(a) The striped melon beetle will attack the melons and cucumbers as soon as they appear. If there are only a few hills, it is practical to protect them by

covering with small screen-covered bottomless boxes. Tobacco dust, lime, etc., are repellents often successfully used.

(b) Large insects such as tomato worms, squash bugs, and various caterpillars may be picked off by hand and killed.

(c) For small leaf-eating insects, such as the cabbage worm, potato-bug, etc., a solution of lead arsenate (about a teaspoonful to a gallon of water) sprayed upon the plants is effective.

(d) Plant lice may be combated with Tobacco Coction or "Black Leaf 40."

(e) Ordinary blights and rots of garden vegetables are controlled by Bordeaux Mixture.

3. Special care. Some of the plants of the garden will need special handling as the season advances. Tomatoes may be tied up to stakes; beans and peas, if of the pole variety, will need supports; celery will need blanching devices, etc. See directions for special treatment of such vegetables in the chapter discussions.

4. Harvesting. Continue harvesting as suggested in May. Harvest head lettuce, bunch onions, peas, etc. Follow directions given in the chapter on putting up an attractive vegetable pack for the market.

5. Succession cropping. To utilize the garden intensively, such crops as peas, radishes, lettuce, turnips, etc., maturing early, should be removed and followed by a succession crop of the same or another vegetable as the demands of the home or market require.

6. Late planting. Plant sweet potatoes, late sweet corn, turnips, beans, late cabbage, etc., as succession crops.

AUGUST

1. Care and cultivation. Continue the care and cultivation as suggested for the other summer months. The season may become dry and hot, but proper care and cultivation may often win out against these odds. Do not allow any weeds to go to seed.

2. Late planting. Late plantings of beans, beets, sweet potatoes, turnips, carrots and mustard may be feasible in some seasons at this time, even in middle latitudes.

3. Harvesting. Continue the harvesting of garden crops maturing this month. Study and practice good methods of grading, bunching, packing, basketing, and otherwise marketing the garden vegetables you have for sale.

4. Canning. (See special calendar for this work.)

5. Visiting. Visit home and truck gardens to compare crops, methods, etc., with those of your own.

SEPTEMBER AND OTHER AUTUMN MONTHS

1. Visiting gardens. Visit home and truck gardens if possible to observe and study how the fall crops are handled. Get definite ideas of the yields of the various crops and of the prices and costs of production.

2. Visiting markets. Visit the city markets and note the assortment of vegetables, prices, packages, and where they were grown. Make written reports of these observations in your notebook.

3. Finishing work. Finish marketing, canning and storing all vegetables from your garden. Allow nothing to go to waste.

4. Fairs. If there is to be a local fair or exhibit

for garden club members, each pupil should prepare under the direction of the club leader an exhibit of canned goods or other produce from the garden for the fair. Members of the club should visit a county or state fair if possible, and report on a few pages of their notebooks such observations on the vegetable exhibits, under **types, kinds, and principal characteristics** by which vegetables were judged and other interesting notes so as to show an appreciation of what was seen.

5. **Cleaning up.** Remove all coarse refuse from the previous garden crops, and apply manure to the garden site, to be plowed under either this fall or next spring in preparation for the next season's garden work.

Canning Club Calendar

MARCH

Canning demonstration by club leader or extension worker. Methods of food preservation. What causes food to spoil: (a) molds, (b) yeasts, (c) bacteria. Object of canning. Methods of canning. (NR series of U. S. Dept. of Agr. canning bulletins.)

APRIL AND MAY

Advantages of cold pack method. Construct a home-made canner. Canning of early vegetables and fruits and use in diet. Examples: spring greens, asparagus, rhubarb.

JUNE

Canning of vegetables and fruits. Examples: peas, early string beans, strawberries, cherries. Advan-

tages of canning fruits and vegetables at proper stage of maturity and as soon after picking as possible.

JULY

Canning vegetables and fruits. Examples: wax beans, raspberries, currants, blueberries, blackberries, gooseberries. Club picnic or play festival. Study of reports. Cost of canning different products and comparison with prices of commercial products.

AUGUST

Canning of vegetables and fruits. Examples: green corn, tomatoes, peaches, apricots, plums, apples.

SEPTEMBER

Preparation for exhibit. Study of containers, local markets. Public canning demonstration or contest. Canning of vegetables and fruits. Examples: young carrots, beets, corn, tomatoes, grapes, peaches, pears, apples.

OCTOBER

Study of other methods of food preservation. Storage. Use of canned products. Uses of fruits and green vegetables in the diet.

NOVEMBER

Final reports and stories.

PART TWO

PRACTICAL EXERCISES

1. The garden plans. (a) Let each pupil carefully draw to scale the plan of the vegetable garden as it is laid out at his home.

(b) After this study let each pupil draw a garden plan as he would carry it out in a home garden of his own.

(c) If it is feasible to have a school garden, let each member of the class draw a plan of such a garden.

2. Laying out and planting the school garden. If conditions at the school are favorable to the employment of labor all through the garden season and if sufficient land is near the school to justify such an undertaking, it may be advisable to carry on a school garden. For a school garden the plan of making a demonstration home garden for an average-sized family is a good one. This plot should be planted and cared for as a class enterprise. The addition of small fruits and ornamental planting may make the whole scheme a valuable practical piece of work in connection with the school study of vegetable gardening. This garden should be carried on as nearly according to directions and correct principles which are given in the text as is possible. For individual work in vegetable raising, the home project garden should be used.

PRACTICAL EXERCISES

19

GARDEN PLAN (20 FT. x 30 FT.)

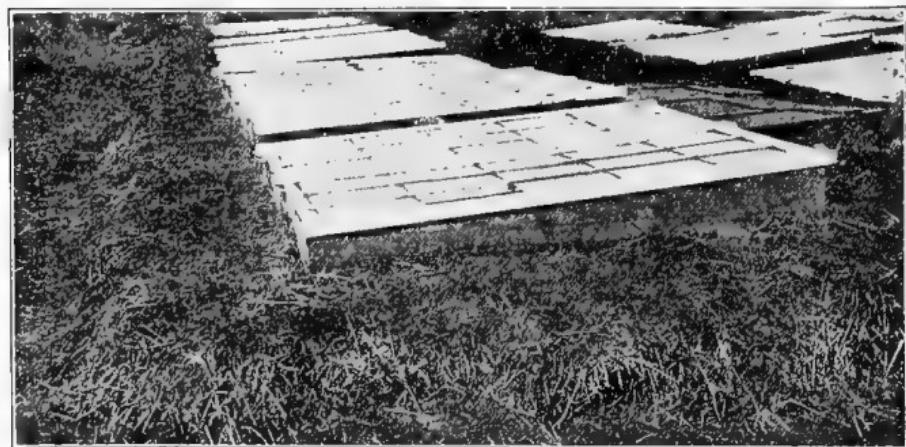
12 IN.	LEAF LETTUCE							
12 IN.		PEAS						
12 IN.	(FOLLOWED BY PEPPERS)							
9 IN.		PEAS						
9 IN.		SPINACH						
9 IN.	KOHL-RABI							
9 IN.	(FOLLOWED BY LATE BEANS)							
9 IN.	RADISHES							
12 IN.	(FOLLOWED BY LATE RADISHES AND LETTUCE)							
9 IN.	ONIONS							
9 IN.	RADISHES							
9 IN.	BEETS							
15 IN.								
9 IN.	PARSNIPS							
9 IN.	RADISHES-2ND PLANTING							
9 IN.	CABBAGE							
12 IN.	(FOLLOWED BY LATE TURNIPS)							
12 IN.	HEAD LETTUCE							
12 IN.		PEAS-2ND PLANTING						
12 IN.	(FOLLOWED BY BEANS)							
12 IN.	PEAS-2ND PLANTING							
9 IN.	RADISHES-3RD PLANTING							
9 IN.	(FOLLOWED BY LATE BEETS)							
24 IN.	WAX BEANS							
24 IN.	TOMATOES							

4. A GARDEN PLAN

3. Cold frames and hot-beds. Since work with cold frames and hot-beds comes during the school season, it is by all means advisable to undertake this practical exercise at school.

(a) Cold frames are devices for growing plants early or hardening them off for the field by making use of the heat of the sun through glass, without any foundation heating. They regulate heat and moisture and protect plants from heavy wind and dashing rain.

The standard size of the cold frame sash is three by six feet, and the length of the cold frame will depend upon the number of sashes to be used. Make the frame six feet wide, eight inches high in front and twelve inches high at the back, of either one-inch or two-inch lumber. A lean-to cold frame on the outside



5. A COLD FRAME

of a building may be made by nailing a two-by-four piece of lumber against the building and constructing the frame upon it. Good garden soil will furnish the seed bed for the plants to be grown in the cold frame.

(b) For a permanent hot-bed, a pit about two

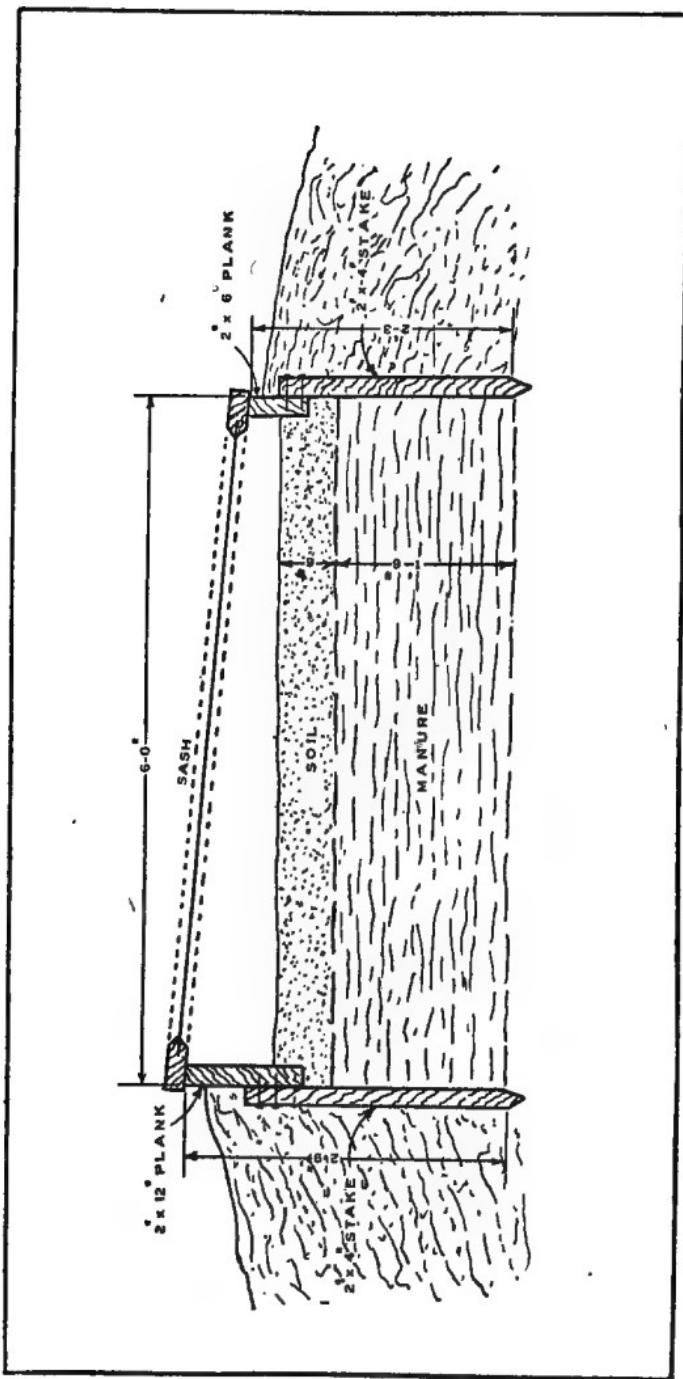
feet in depth is dug. If it is desirable to make one so large, the length may be six or nine feet, with a width of three feet—the length of a window sash to be used over it. The sides and ends of the pit are supported by a lining of plank held by corner posts. The plank frame should extend above the surface of the ground eight inches at the front and twelve inches at the back. The hot-bed is heated by horse manure, containing straw bedding or one-third leaves. Prepare the manure by stacking it in a compost heap, turning it over every three or four days, and restacking. After three or four days more, mix it carefully and spread it evenly in the hot-bed pit, about fifteen inches deep. Tramp down firmly. Scatter four or five inches of good garden loam over the manure in the hot-bed. Make frames for the sash, place them over the hot-bed and allow the bed to heat up. Do not plant any seeds in it until the temperature subsides to at least 90 degrees.

Early lettuce, radishes, cabbages, tomatoes, eggplants and other vegetables may be sown thickly in rows four or six inches apart in the hot-bed, and under proper care by the time warm weather comes the school will have plants from its own garden with which to supply the club or neighborhood.

In addition to the sash, mats of carpet will be needed on cold nights. During bright days, it may be necessary to lift the sash a little to allow the hot air to escape and give ventilation. Hot-beds should be watered in the morning on bright days.

Draw a plan of the hot-bed and keep a notebook record of the work done.

4. Cultural requirements of vegetables. Place in the notebook the following table and fill out the cul-



6. A Hot-Bed

tural requirements of the standard garden vegetables grown.

Vegetables	Soil Requirements	Season Requirements	Care Requirements
.....
.....
.....
.....
.....

5. **Making a canner.** A wash boiler, a fifty-pound lard tin or similar vessel with a lid may be used for a "cold pack" canner. All else that is necessary is a false bottom or rack platform which will lift the glass jars from the bottom and permit the circulation of the water under and around the jars.

In order to make a rack secure some strips of wood one-half inch by one inch or one inch square. Make a lattice-work platform that will fit in the improvised canner, with open spaces between the strips of such size that two fingers may be inserted. This may be done by determining the approximate length of the several pieces, nailing them together, and then by placing the lid or bottom of the canner on the platform, marking the outline of the bottom. Saw off the ends of the strips about one-half inch back of the mark. This will make it easy to get the platform in and out of the canner. Secure a piece of telephone wire of such length that two loops of wire for handles may be twisted around the platform, extending to the top of the canner. A third piece of wire may be twisted around these loops parallel to the platform at such a height as to act as a guard rail and prevent the glass jars from sliding off when a load is lifted in or out of the canner.

6. **Canning corn and peaches.** This exercise is given in order to outline the method and procedure of the cold pack process. For recipes for canning other products, see the NR Series listed under Exercise 7.



7. A HOME-MADE CANNER

(a) **Corn.** Corn should be canned when it is in the milk. Can as soon after gathering as possible, at least the same day. If it is necessary to keep it for a short time spread the ears out in a cool place.

Boil water for the canner in a teakettle and a gallon or two-gallon stew kettle. The amount of water to be heated will depend upon the amount of corn to be canned. Fuel and time may be economized by not filling the canner more than one-third full. Later the water used for blanching and that left in the teakettle may be poured in.

While waiting for the water to boil remove the husks, silks and shanks of the ears. When the water

in the stew kettle is boiling (boiling water is jumping), place a half dozen ears in a square of cheese cloth or muslin and tie the opposite corners. Immerse in the kettle for from five to fifteen minutes. Remove and plunge into cold water. Remove and cut from the cob. This is best done by placing the ear, butt down, in a shallow pan or dish, cutting down with a sharp, thin knife and scraping up.

The corn is then packed in the glass jars or tin cans to within a quarter of an inch of the top. A teaspoonful of salt and one of sugar per quart and boiling water to fill up the jar, are added.

Tin cans are sealed completely. *Good* rubbers and tops are placed on the glass jars, but they are *not* sealed completely. Mason jar tops are screwed down tight and then turned back a quarter turn. Glass tops with a wire bale are placed in position but the tightening lever is *not* pulled down. Economy jar lids and metal bales are placed in position.

The products are now ready for the canner. For most products it is all right to wait until the rack is full and then to place the entire lot in the canner at one time. Corn, however, should be put into the boiling water as soon as it is packed in the jars. The first few jars will not be completely immersed but by the time the canner is filled the water may be the required inch over the top of the jars. If not, the bleaching water and that left in the teakettle may be poured in, as has been suggested. If the water is boiling, there will be no danger of the blanching water getting into the jars as inspection will show bubbles coming out. The lid should then be placed on the canner and the boiling continued for three hours in the case of quarts and one-tenth less time in the case of pints. At the

expiration of this time, the jars are removed and the lids tightened. If it is found that a rubber has been blown out of place it should not be pushed back but removed and a new one substituted. The jar should then be put back in the canner and sterilized for another five minute period.

Corn on the cob may be canned by the same method by using wide mouthed jars. This is not an economical method of food preservation, however. All jars and tops should be carefully inspected before use.

Be sure that Mason jar tops are smooth and touch the rubber at all points. This may be determined by screwing down the lid, without the rubber, and trying to insert the thumb nail at different points. Be sure, too, that the wire bale of glass topped jars comes into place in the slot with a click. Defect may be remedied by bending the wire in.

(b) **Peaches.** The canning of peaches differs from that of corn in three respects: (1) The peaches are "hot-dipped" about one-half minute. (2) Syrup* instead of water is poured over them. (3) Peaches are sterilized in the hot-water canner for sixteen minutes only.

7. **A canning demonstration.** The class should give a public canning demonstration. Parents, patrons and friends may be invited. It will add greatly to the appearance of this demonstration if the members of the demonstration team are attired in white aprons and caps, bearing the official club insignia. Directions for making these are given in a bulletin listed in the

*If sugar is high, fruit may be put up in water. For directions for making syrup see NR-21, U. S. Department of Agriculture, Canning Leaflets.

references. The following equipment and material will be needed:

- 1 *Good Stove*—This is most important—3 burner, gas, gasoline, or kerosene. If a gasoline stove, be sure that the gasoline line has no leaks; trim carefully the wicks of a kerosene stove.
A convenient supply of clean, pure water.
 - 2 long tables.
 - 2 yards cheese cloth or muslin for blanching.
 - 4 or 5 tea towels.
 - 1 teakettle.
 - 2 water pails.
 - 1 garbage pail.
 - 2 stew kettles with lids.
 - 1 small stew pan with handle (for making syrup).
 - 3 large spoons.
 - 2 forks.
 - 3 paring knives.
 - 2 dish pans.
 - 1 metal cup.
 - 1 dozen pint jars (glass)—any style—it will be more instructive to have several kinds.
 - 2 dozen rubbers—best quality.
- Sugar.
Salt.
- 1 or more kinds of vegetables.
 - 1 or more kinds of greens.
 - 1 or more kinds of fruits.

Suggestions

1. Have chairs enough for the audience.
2. The demonstrator requires the services of two women.
3. He will plan to use boys and girls, when possible, in preparing products.
4. Thoroughly test stoves and have hot water ready when demonstrator arrives. This will save time.
5. Do not provide too large quantities of materials to be canned.

6. Be sure perishable products are fresh.
7. The question of time at the disposal of the demonstrator will determine the kind and quantities of materials to be canned. Vegetables like corn, peas, and beans require three hours in the home-made canner; root and tuber vegetables and greens require ninety minutes; fruits, ten to twenty minutes.

In giving the demonstration, the following points should be explained. Information may be obtained from this booklet and from the references given below. Such explanations may be given while waiting for different steps in the process to be finished. A good demonstrator works and talks at the same time.

1. Why Foods Spoil.
2. Methods of Food Preservation.
3. Methods of Canning.
4. Types of Canning Equipment.
5. The Cold Pack Process.
 - (a) Blanching, scalding and cold-dipping.
 - (b) Packing in containers.
 - (c) Making syrup.
 - (d) Jars and rubbers.
 - (e) Sterilization.

Pertinent facts, recipes and steps in the process may be placed on the blackboard to aid in the work, or cloth or paper charts may be made by the class.

References

McConn—Yeasts, Molds and Bacteria.

U. S. Department of Agriculture. NR Series of Canning Leaflets.

*These may be obtained free from your state club leader or the U. S. Department of Agriculture, Washington, D. C.

- NR-21—Home Canning Instructions—Methods and Devices.
NR-24—Home Canning Instructions.
NR-25—Additional Recipes.
NR-30—Canning Apples.
S-6—Home Canning Club Aprons and Caps.

8. **A canning contest.** This may be held in connection with a school exhibit, fair or agricultural short course. Contests may be held between neighboring school clubs at a county fair, a farmers' institute or similar gatherings.

Rules for Contest

1. Teams must consist of five members.
2. Entries limited to five teams.
3. Each team to demonstrate the canning of one fruit and one vegetable:

Fruit—1 quart of apples (or other fruit selected by committee).

Vegetables—1 quart tomatoes (or other vegetables selected by committee).

Basis of Award

Time required	40
Quality of product.....	40
Skill	20
<hr/>	
Total	100

(The canned products will remain the property of the committee.)

4. Each team must supply the following equipment for the contest:

1 can or covered pail, lard can, or wash boiler, with false bottom.
2 tablespoons, 1 teaspoon, 1 long-handled spoon.
1 jar funnel.
1 measuring cup.
5 pans (for preparing fruit and vegetables).
1 covered pan (for syrup).
4 paring knives.
2 yards cheese cloth or a wire basket, for blanching products.
Small jar of salt.
Tea towels.

To be supplied by committee for each team:

2 gasoline or oil stoves (two or three burners).
2 tables (or one long one) with paper or oilcloth on top.
1 teakettle.
1 water pail (with supply of fresh clean water).
1 garbage can with cover.
1 pound white granulated sugar.
Jars enough for products (with a few extra).
Good can rubbers.
5 pancake turners (to be bent and used in getting jars out of
canner).
Fruits and vegetables for canning (as specified).

No explanation of the cold pack process of canning will be given during the contest. The work must show for itself. An explanation of club work, cold pack process, etc., will be given before the contest starts, and the club members will be expected to answer questions on their work after the close of the contest.

9. Census of food preservation. Let each member of the class ascertain from each of ten or more families the average amount and kind of products stored for winter use, such as potatoes, meat, etc., and the method of preservation, such as cold storage, pickling, salting, drying, canning, etc. Let this information be collected on the blackboard and finally recorded in the following table:

10. Outline for studying vegetables. A better crop can be produced if the grower knows, before planting time, the soil requirements, cultural methods and harvesting possibilities of each vegetable grown in the garden.

The following outline has been prepared for this purpose. It is important that children fill out a sheet of their notebook for each vegetable to be grown. Subject matter may be found in seed catalogs published by local seed firms, in bulletins published by state experiment stations, in bulletins published by the United States Department of Agriculture, and in any good book on vegetable production. Frequent conversations with successful gardeners will tend to clear up some of the things that are not understood:

Outline:

Name and variety of the vegetable to be planted.

Soil requirements.

Fertilizer requirements.

Method of propagation—seed, bulb, and tuber.

Seasons of planting.

Methods of planting.

- . 1. How far apart are the rows?
2. How far apart are the plants in the rows?
3. How deep is the seed, tuber, or plant planted?
4. How many seeds are needed for 100 feet of drill?

Location of the vegetable in the garden.

1. Is the vegetable sun-loving in its habits?
2. Is the vegetable shade-loving in its habits?
3. Will the vegetable shade or crowd other vegetables?

Care of the crop.

- 1 How often should the crop be cultivated?
2. What is the required distance between plants for the full development of the vegetable?
3. Does this vegetable need to be transplanted?
4. Does this vegetable need to be staked?
5. Does this vegetable need to be blanched?
6. Does this vegetable need to be sprayed?
 - (a) What is the purpose of the spray?
 - (b) What is the best spray to use?
 - (c) How often should the crop be sprayed?

Harvesting.

1. When should this vegetable mature?
2. How is it prepared for home use?
3. What is the canning possibility?
4. Is there a market demand for this vegetable?
 - (a) How should it be prepared for market?
 - (b) What price should it bring?
5. What seeds can be selected for next year's crop?
6. How is the fresh vegetable stored for winter use?

PART THREE

VEGETABLE GARDENING

Factors in locating the home garden. There are several important factors in locating the home garden. Convenience to the house is one of them. A southern or southeastern slope will give the best results with early vegetables. It should not be too steep, however, for the crops may then suffer from the drought and the heat of summer, and the land be liable to wash. It is desirable to have lower ground below the garden in order to allow for air and water drainage. If the ground is not well drained naturally, it should, of course, be tile-drained. In a level country it would be well to provide some protection in the way of trees or buildings on the northern side. These, however, should not be too close to the garden. The kind of soil is important. With most vegetables, sandy loam will give the best results. One should not despair, however, if he does not have the ideal soil, for most of the common vegetables adapt themselves to a wide range of soils. Where the slope of the site or the type of soil varies appreciably, one should plant the crops accordingly. For instance, sweet potatoes should be planted on the higher and drier places, and they do best in clay loams; watermelons like a sand ridge; cucumbers and celery prefer the low, damp ground.

The mechanical preparation of the garden soil. The ideal garden soil preparation is to manure and plow

the land in the fall. This practice will aid in rotting the manure and any other organic matter that has been turned under. It always helps to destroy injurious insects, injurious bacteria, and weeds. Furthermore, it improves the physical texture of the soil. If the land is naturally loose, it need not be plowed again in the spring, especially for the early short-season crops. In such case, disk ing or deep cultivation will be sufficient. If the land is "tight," or even in the case of "loose" textured soil which has become much packed during the winter, it is better to plow again in the spring.

The seed bed. The best way to prepare a seed bed is as follows: first, disk and harrow; then plow, disk, and harrow, in order, until the ground is thoroughly pulverized and properly compacted. A drag should be used if necessary to convert the surface to a finely pulverized condition. In this connection the compacting of the soil should be emphasized. Many people fail to work the soil sufficiently because they fear it will pack the soil too much. This is a mistake, as most plants need a somewhat compact soil in order to be able to gain a foothold. The above method will insure a fine pulverization of the soil to the full depth of the plowing and a sufficiently compact soil as well.

Some vegetables cannot be planted until May or June. In the case of land to be devoted to such crops a shallow mulch should be maintained until planting time. This will save the moisture and make the preparation of the soil much easier. *This fact is very important.*

Fertilizing the garden. For the vegetable garden manure is the best general fertilizer. It should be applied in the fall and turned under. If, however, it is applied in the spring, it is well to have rotted manure.

Rotted manure is also sometimes used for top dressing purposes for the growing crops. Lime should be used every few years, as the large amount of decaying organic matter in vegetable lands is constantly causing the formation of acids in the soil. Crop refuse, unless infected with some serious disease or insect, should always be turned under in preference to removing or burning it. The garden is a good place upon which to burn all trash that accumulates about the yard or farm. The ashes add both potassium and lime. Any organic matter that will rot easily and quickly should be plowed under; leaves, branches, etc., should be burned and the ashes scattered. If manure is scarce, one can grow cowpeas, soybeans, or rye to help keep up the supply of organic matter.

Commercial fertilizers can often be used effectively in the garden. For nitrogen, sodium nitrate is usually the best form. It should be applied as a top dressing to the growing plants, using 80 to 100 pounds per acre, applied at intervals of from ten days to two weeks. The nitrate should be scattered about the plants, care being taken that none gets on the leaves. It should be cultivated into the soil, and it may also be spread broadcast before or during a rain. The number of applications will depend upon the length of the growing season of the crop treated. In case of crops which bear fruit it is not well to continue the applications of sodium nitrate too long, as it may stimulate vine growth at the expense of fruit production. Dried blood also may be used as a source of nitrogen. Nitrogen in dried blood is not so subject to loss by drainage waters as that in sodium nitrate. When this is employed, it may be applied in relatively large amounts at the beginning of the season, as no injurious results

come from the dried blood as in the case of sodium nitrate.

Steamed bone meal is a good form of phosphorus for the vegetable garden. Phosphorus may be supplied much cheaper by using raw rock phosphate, but it must be applied two or three years in advance. The use of acid phosphate is more justifiable in vegetable growing where quick results are desired than in general farming, though it carries with it some acid. If lime is applied every two or three years, it will correct any acidity that may accumulate in the soil.

Sulphate of potassium is a good form of potassium to use on a vegetable garden. This element, while abundant in most soils, will frequently cause added yields, especially in the case of root crops. Wood ashes are always an especially good form to use, and all the wood ashes which accumulate on the farm should be carefully stored away under cover so that no leaching will occur. Wood ashes will nowhere give better results than in the vegetable garden. Coal ashes have no value as a fertilizer, though they can often be used effectively in helping to loosen a "tight" soil.

Laying out the home garden. The laying out of the garden will largely depend upon the ease of tending and the most profitable use of the land. The vegetables should be planted in long rows rather than in patches. If not enough of one vegetable is used to plant a whole row, two or three kinds can be grown in a single row. The planting should be started on one side of the garden and should proceed across it with the season. It is hard to work up the soil if patches are left between beds of growing vegetables. The coarser crops that are cultivated with horse tools should be grouped together as nearly as possible. The

finer crops that are cultivated with wheel hoes should also be placed together. The tall growing and the low growing crops should be grouped with their kind, so far as circumstances will permit. The vine crops should be planted together, as should crops that are planted at the same time and which require about the same length of season to mature. This will allow for the best use of the land for a second crop. The matter of succession should not be overlooked. Usually the succession crops can be planted where other vegetables have been grown earlier in the season. The garden properly planned will not only be easy to tend, but will facilitate the production of crops throughout the growing season.

Selecting varieties and getting good seed. The selection of the proper varieties is one of the most important features in vegetable gardening, for no matter how well other factors in successful growing are attended to, they may come to naught if the wrong varieties are selected. It is always best to place the main dependence upon the standard and proved varieties. "Novelties" should be used for trial only until they have proved themselves, no matter how enticing they may appear in the seed catalogs. One should pay particular attention to selecting varieties that are adapted to the season in which grown; for instance, one would not want to use the same variety of sweet corn for the early crop that he would use for the main season crop.

Seeds should be purchased from a reliable seedsman, one who expects to stay in the business and who has a reputation to maintain.

Early season and late season plants. There is perhaps no feature in vegetable gardening regarding which more mistakes are made than the time of plant-

ing the various crops. Most people do not realize that the thirty or forty common vegetables which anyone could name in a few minutes were brought here from all parts of the earth, and that we can only succeed in growing them here by furnishing them with relatively the same conditions under which they originated and developed. Naturally, coming from many widely different climates, each crop has its special temperature and moisture requirements. We recognize this tendency by growing them during a time of the year best suited to their needs, and by planting them in moist or dry locations according to their preferences. Happily, the thirty or forty different vegetables divide themselves into groups according to the temperature and moisture requirements, so that instead of it being a problem of remembering thirty or forty different cultural methods, we may reduce the number to a very few by dividing the vegetables into groups.

All vegetables may be divided into two general groups: "cold-season" and "warm-season" groups. The cold-season crops are those which originated in temperate climates, and the warm-season crops are those which originated in the tropical and subtropical regions.

Planting table. The following table takes into account the seasonal requirements of various garden crops and also indicates the varieties that should be planted at different times. There are other varieties which no doubt could well be added to this list, but those named can be depended upon in general to give satisfactory account of themselves. By selecting the varieties named and planting them as nearly as possible at the times mentioned, taking into consideration the latitude of the place in which they are grown, the

various vegetables can be had at all those times of the year when it is possible to have fresh grown vegetables.

PLANTING DATES AND VARIETIES RECOMMENDED FOR FARMERS' VEGETABLE GARDENS IN ILLINOIS

By C. E. DUBST, Associate in Olericulture, University of Illinois.

NOTE.—The times for planting named are especially adapted for central Illinois; in southern Illinois plant early crops from one to two weeks earlier in each case, and in northern Illinois about one week later.

PLANT- ING DATES	CROP	VARIETIES SUGGESTED FOR ILLINOIS PLANTING
Peren- nial Crops	Asparagus	Palmetto (Plant one year old roots in early spring)
	Rhubarb	Victoria or Linnaeus (Divide old roots and plant in early spring)
	Winter Onions..	Egyptian (Replant the sets each year about Sept. 1)
April 1	Potatoes	Early Ohio
	Peas	Alaska (climbing), American Wonder (dwarf)
	Onion Sets.....	Yellow Bottom
	Onion Seed	Southport Yellow Globe, Southport White Globe
	Beets	Crosby's Egyptian
	Turnips	Early Purple Top Milan
	Carrots	Chantenay or Half Long
	Parsnips	Hollow Crown or Improved Guernsey
	Parsley	Double Curled
	Radishes	Early Scarlet Turnip, White Strausburg
April 10	Spinach	Victoria or Long Standing
	Leaf Lettuce....	Black Seeded Simpson
	Radishes	White Strausburg
April 10	Head Lettuce...	May King (Start plants in hot-bed March 1)
	Peas	American Wonder or Gradus (climbing)

PLANT- ING DATES	CROP	VARIETIES SUGGESTED FOR ILLINOIS' PLANTING
April 10	Cabbage	Early Jersey Wakefield or Copenhagen Market (Start plants in hot-bed March 1)
	Cauliflower	Burpee's Dry Weather (Start plants in hot-bed March 1)
May 1	Cabbage	Early Summer (Start plants in hot-bed about March 15)
	String Beans... Sweet Corn.....	Davis White Wax, Stringless Green Pod Golden Bantam White Cob Cory White Evergreen or Country Gentleman
May 15	Tomatoes	Chalk's Jewel, Stone (Start plants March 1 in hot-beds)
	Lima Beans.....	Henderson's Bush, Lima
	Cucumber	White Spine or Henderson's Perfected
	Summer Squash.	Fordhook, Giant Crookneck
	Winter Squash..	Hubbard
	Watermelons ...	Halbert Honey or Kleckley Sweet
	Muskmelons	Notted Gem, Hoodo, Osage
June 1	Sweet Corn.....	White Evergreen or Country Gentleman
	Eggplants	New York Improved Purple (Start plants in hot-bed March 15)
	Pepper	Chinese Giant, Red Cluster
	String Beans.... Sweet Potato.....	Stringless Green Pod, Saddleback Wax Yellow Jersey
June 15	Sweet Corn.....	White Evergreen or Country Gentleman
	Late Potato.....	Rural New Yorker
	Late Cabbage....	Flat Dutch, Danish Ball Head
	Cucumbers	(for pickles) White Spine
July 1	Celery	Golden Self Blanching, Giant Pascal (Start plants in frames about Apr. 1)
	Beans	Stringless Green Pod, Saddleback Wax
	Sweet Corn.....	White Evergreen or Country Gentleman
July 25	Turnips	Red Top Strap Leaf
	Beans	Stringless Green Pod, Saddleback Wax
Aug. 15	Winter Radish..	Chinese White, Long Black Spanish
	Fall Spinach....	Dwarf Siberian

Seed sowing. The importance of planting good seed can hardly be overestimated. Upon the selection of the seed often depends the success or failure of the crop. The most important factors determining the quality of the seed are viability and truth to name and type. Good seed is reasonably free from weed seeds and dirt, but the grower should be sure his seed is clean before planting it. The best practice is to plant fresh seeds, preferably not more than one year old. Seeds should be stored in tight bags in cool dry places. Successful seed sowing requires a thoroughly prepared seed bed, because the more thorough the preparation of the seed bed, the less work is required to keep the ground in condition during the growing season. In the home garden the seeds are usually planted by hand by dropping them in the hills or furrows previously prepared. After planting, the soil should be firmed by pressing it down with the back of the hoe. For the best and quickest results, seed should be planted in freshly prepared ground.

Advisability of the hot-bed. Hot-beds are practically indispensable in the making of a good vegetable garden: Their greatest use is in starting plants for outdoor crops. By their help (in the case of some vegetables) one can have earlier yields than is possible from an outdoor crop, and what is more important he can grow some crops which could not be otherwise grown (long season crops like eggplants and sweet potatoes, etc.). They can also be used for growing such crops as lettuce or radishes to full maturity out of their season.

Principles of successful transplanting. Transplanting, while it must always be looked upon as more or less injurious to the plants, is a necessity in vegetable

gardening. It is used principally for inducing early maturity; it also enables us to grow some crops like eggplants which otherwise require too long a season. By putting plants in hot-beds or frames, as long as they can be so handled without injury, they can later be planted in soil which has been freshly worked with the assurance of an early yield; whereas if the seeds were planted directly in the open, the young plants would have to battle with bad weather and soil conditions at the time when they could least endure it.

The time of planting the seeds will depend altogether upon the crop grown. The operations will be facilitated if the seeds are sown in shallow flats, which may be carried about as desired. When the plants have begun to show their first pair of true leaves, they should be shifted, which is nothing more or less than taking them up from the seed flat and planting them in other flats or in pots where they are given greater room. In the case of eggplants and head lettuce, which do not transplant easily, it is better to handle the plants in pots than in flats, for they transplant to the open more readily because their root systems are injured less. Cabbage, cauliflower, kohlrabi, Brussels sprouts, and tomatoes can be very well handled in flats, or they may be shifted to the open bed. Onions are sometimes started in the hot-bed in order to secure a larger bulb, but they are never shifted. Sweet potatoes are never shifted. Beets are often started in greenhouses or hot-beds, by market gardeners, to secure an earlier crop but they too are never shifted.

A short time previous to planting in the field, the plants should be transferred to a cold frame so that they may "harden off." A cold frame is like a hot-bed with the exception that it has not bottom heat. -

"Hardening off" is the term applied to accustoming the plants to the open weather conditions so that they will not suffer from the transfer to the open. The cold frame is covered for the first few nights and is left open on all except cool days. Gradually the plants are exposed to colder and colder weather, until finally the covers are left off altogether for a few days or a week previous to transplanting to the field. It should not be overlooked that hardening off is an accustoming of the plants to both the cold and the relatively dry open field conditions. The plants should receive sufficient water to keep them from dying, but gradually the amount of water applied should be reduced while they are in the cold frame, so that finally they will get along without the addition of any water.

It is always desirable to let the soil in the cold frame become rather dry for several days before transplanting. This, together with the exposure of the plants to cold nights, will harden the tissues and fit them for transfer to the open soil. A few hours before the actual transplanting, the soil should be heavily watered. The plants, being "thirsty," will take up enough water to fill their tissues, in which condition they will be able to allow more transpiration. The plants should not be removed from the frames until the soil has become mellow. Puddling the soil by working it while wet should always be avoided. As large a part of the root system as possible should be removed with the plant, and it is well to leave as much soil on the roots as will cling.

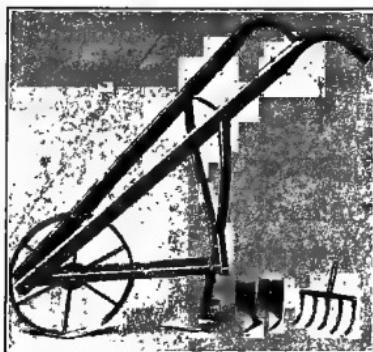
In transplanting plants to the field one should firm the soil about the roots thoroughly. If a plant is properly transplanted, watering in the field is scarcely ever necessary, but in the home garden one will insure a

stand if he takes no chances and waters the vegetables. When water is applied, it is always best to pour it into a basin made about the plant, allowing it to disappear, and then to cover the wet surface with mellow, loose soil. The principal factor in causing the death of plants is an excessive transpiration from the leaves. The removal of a part of the top of the plant will reduce the transpiration and often save it during a dry period. Not all plants can be "sheared," but onions, beets, celery, and to a certain extent cabbage, will not suffer. The best implement for transplanting, everything considered, is a pair of human hands. Other serviceable tools are the garden trowel, the dibber, and the spade. In commercial gardening, a transplanting machine which sets the plants as fast as a team of horses draws the machine is often used.

Thinning vegetables. Plants must have sufficient room if they are to develop properly. All excessive plants are nothing more than weeds. With many vegetable crops the planting is done in such a way as to give plenty of room. Cabbage, tomatoes, sweet corn, and beans are examples. With most of the small seeded crops, however, the seeding is usually liberally done on account of the weak embryo and the susceptibility of the young plants to the weather and soil conditions. However, even in such cases the planting should be within certain bounds. Market gardeners even go so far as to test the seeds in advance and plant accordingly, so as to insure a good stand and yet prevent overcrowding. In this way little thinning is necessary. The vegetables commonly planted in drills in the field and which require thinning are beets, parsnips, parsley, salsify, and onions. Melons and

cucumbers are often planted thickly in the hill and thinned when the plants have become well started. The thinning of growths which are started on the inside and transplanted to the open field is accomplished by shifting the plants to other flats or pots, as already explained, and setting them in the field, one in a place. The thinning of all crops should be done as early as the size of the plants will permit. In case of onions, since they must be grown to a good size before the plants will pull out without breaking off, the thinning may be delayed somewhat. Thinning of the crops insures specimens of larger and more uniform size, and a much greater percentage of the product is marketable or usable.

Cultivation. The control of weeds and provision for a soil mulch is the most important work in the cultivation of the garden. Some people actually doubt that



8. A WHEEL HOE

cultivation has much value if there are no weeds. After each rain, as soon as the ground will permit, a shallow soil mulch should be made, and the crust broken up.

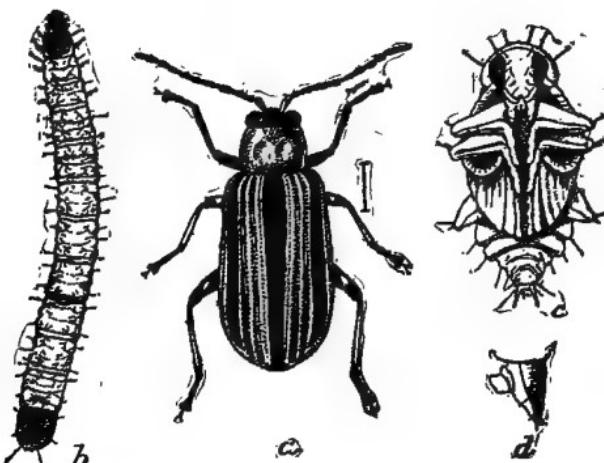
Garden tools. Every garden should have a wheel hoe. It will make gardening a pleasure instead of a

drudgery. There are two kinds: the single wheel is used between the rows, the best use of which is insured when the rows of vegetables are planted exactly parallel; the double wheel hoe, which like the two-horse cultivator straddles the row, cultivates both sides at once. The latter is a better implement to use while the crops are small. Several attachments are provided for both types. The hoe blades can be so set that they will scrape very close to the row, killing weeds and providing a shallow soil mulch. Another attachment which comes with the machines is a set of cultivator teeth, which dig in deeper, for use when the plants are larger. In the home garden it is probably not advisable to have a seed drill. This tool, while indispensable in planting an area of any considerable size to fine seed, is not so well adapted to the home garden. There is nothing better than the human hand for distributing the seeds as they should be, as there is nothing which adapts itself more easily to difference in thickness of seeding and difference in size of seeds.

Most serious garden pests. (a) Green cabbage worm. This worm is the greatest obstacle to cabbage growing. Control early in the season is insured with arsenical poisons, which are without danger to human beings. Some authorities even say that they can be used after the plants have begun to head. While this view seems reasonable, it is perhaps best to be on the safe side and not use poison after the heads begin to form. Later on pyrethrum and white bellebore may be used.

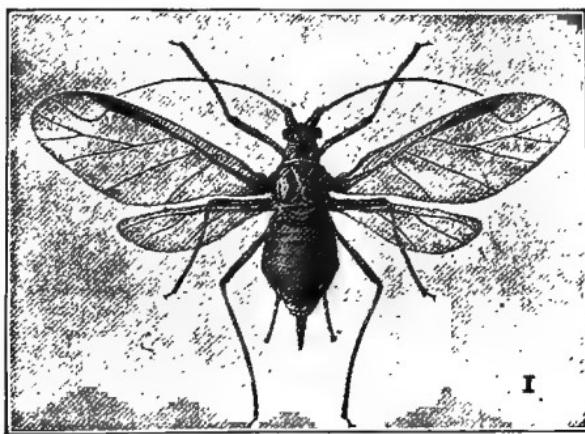
(b) Striped cucumber beetle. Control by applying Bordeaux mixture and arsenate of lead to the young plants as soon as they appear above ground. The

plants should be kept covered both under and over with this material until they have begun to run. For cucumbers or melons the standard Bordeaux mixture



9. STRIPED CUCUMBER BEETLE

is too strong, and a mixture containing half the usual amount of copper sulphate should be used. A mixture of 5 pounds lime, 2 pounds copper sulphate, and 2

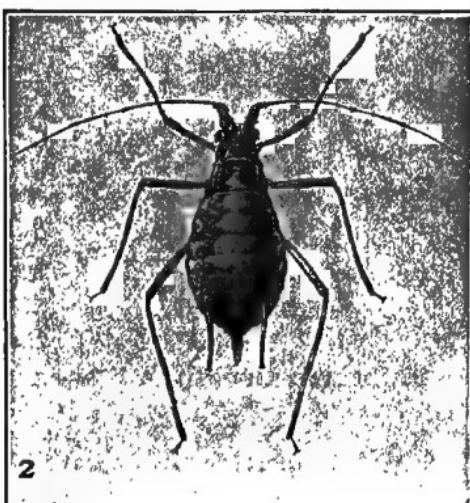


10. PLANT LICE, WINGED TYPE

pounds lead arsenate, in 50 gallons of water will not injure the plants and will effectively control the insect.

(c) Lice. Melon lice often destroy a melon or cu-

cumber crop in a few days. This insect may be effectively controlled by spraying with a solution of nicotine sulphate—40% solution. A solution of one part in one-thousand parts of water will produce the desired result and will not injure the foliage. The lice live



11. PLANT LICE, WINGLESS TYPE

mainly on the under surfaces of the leaves. As they do not chew but rather get their food by sticking their beak into the tissue of the plant and drawing out the sap, it is necessary to cover their bodies with the material named in order to kill them. Arsenical poisons are of no help in controlling this insect.

The method of applying the spray is as important as the material itself. For the best results use a Vermoral nozzle with bent shank, fastened on the end of a spraying rod. If the nozzle is worked about and between the foliage thoroughly and a fairly high pressure is maintained, the material will be thrown out in a fine spray and practically every insect on the plants will be reached.

(d) Colorado potato beetle. Paris green, or lead

arsenate, mixed with a little slaked lime, are the insecticides to use for this pest.

(e) Flea beetles often cause serious damage to tomatoes, eggplants and potatoes. This is a small black beetle which jumps from plant to plant when disturbed. They may be effectively controlled by keeping the plants covered with Bordeaux mixture and arsenate of lead.

(f) Cutworms. These often are of serious damage in the spring of the year while the ground is still cold; therefore it is always well to avoid planting vegetables on sod ground if possible. Sometimes manure which has laid on a pile during the previous summer provides an ideal place for the cutworm moths to lay their eggs, and such manure often adds multitudes of cutworm eggs to the soil. If the number of plants is not too great, the cutworms can be best controlled by uncovering the earth about the plants which have been attacked and hunting out the cutworms. Bran mixed with molasses and a small amount of Paris green placed in small pits on the higher spots of the land will often be effective.

Diseases. The leaf spots and fruit rots so common to vegetables are caused by fungus and bacterial diseases. Some of these cannot be controlled, but most of them yield readily to systematic applications of Bordeaux mixture.

* * *

Small fruits should be included in the garden: strawberries, blackberries, red and black raspberries, gooseberries, currants, grapes, etc., but in a course of study including so many phases of agriculture, these topics cannot be taken up.

Facts for this chapter were given by Professor C. E. Durst of University of Illinois.

Preparing products for market. To sell garden products profitably one must know how to make them attractive to the purchaser. Products should be clean, of proper size, shape, and degree of ripeness. Those that are marketed in bunches, baskets or other containers should be uniform in these respects.

Usually there are two grades of products: fancy selected, and number one, besides culls. It should be borne in mind that number one is the lower grade. The fancy selected grade will be of proper size, color, degree of ripeness and free from blemishes. A bunch or a basket will be uniform in these respects. Size should be characteristic of the variety. A beet the size of one's head would not be graded as fancy selected. Color and shape are other characteristics which should be considered in connection with the different varieties of products. The degree of ripeness at which the products are to be packed for market will depend upon the distance to market. Some products which are to be shipped some distance will be picked green.

In grading products it may be well to use a typical specimen as a sample and compare others with it. The following description* of the grades of tomatoes may serve to make this point of grading clear. Fancy selected tomatoes are sound, smooth, regular in shape, free from cracks, and of such size that twelve specimens will fill one basket of a flat or a four basket crate. Number one grade is composed of sound specimens, slightly inferior to the fancy selected grade in size and smoothness, or with slight cracks about the stem which may have healed over so that there is no danger

*Lloyd—Productive Vegetable Gardening.



12. A VEGETABLE EXHIBIT

of leaking. Culls are badly cracked, rough, over-ripe or under-sized specimens. Tomatoes which are smaller than twenty to the basket would be regarded as culls.

Products which are to be bunched may be first graded and then washed after bunching. This makes handling easier. All root crops, early in the season, are bunched. Radishes (except the winter type) are bunched at all seasons. In this class are green onions, asparagus, rhubarb, kohlrabi, parsley, leeks, celery and sometimes leaf lettuce. String, raffia and tape are used in tying. Rubber bands are often used for asparagus.

The size of the bunch will depend upon the product. Bunches of radishes may contain five or six or ten or twelve depending upon size. As a novelty, white and scarlet radishes may be arranged in the same bunch. Asparagus bunches should be about eight inches in length and of such circumference that the hand will go about two-thirds of the way around.

Bunches of onions will appear to better advantage if the tops are trimmed off. The tops of all small beets and carrots (in size about forty to the quart) should be left on. Later in the season larger specimens may be marketed in bulk with the tops removed.

The importance of uniformity in the appearance of such products may be demonstrated by comparing two bunches, one of which contains specimens uniform in all respects and the other, products of all sizes, colors, shapes, and degrees of ripeness.

Preparing and arranging an exhibit. The first impression of an exhibit cannot but have an effect upon the judge or visitor. There are three factors aside from the individual excellence of products which determine the quality of an exhibit: *cleanliness of products, uniformity, and arrangement.* What has been

said in regard to the selection and preparation of products for market would apply in the case of their preparation for exhibition.

The exhibits of a garden and canning club might be placed on two shelves and a vertical surface. The lower shelf, the larger of the two, placed about the distance of a table top from the floor, is slightly inclined and contains the fresh products. The upper shelf, placed about two or three feet above the lower shelf, contains the canned products. On the wall behind this or on the vertical surface of boards which might be built up if the display is in the center of a room are placed the record books and decorated club booklets. Larger vegetables, like cabbages, cauliflower, melons, cucumbers, squash, etc., are placed at the back of the first shelf and the smaller products in front. Four tomatoes placed on a paper or china plate (or twelve tomatoes placed in a square basket) may constitute an exhibit. All wilted or torn leaves should be removed from a cabbage or cauliflower. Beans may be exhibited in peck measures. The uniformity idea may be carried out in a canning exhibit by using glass jars of the same type.

Saving perishable foods. Do you recall the fable of the Grasshopper and the Ant: how the former played all summer while the latter toiled to store up food for the winter? Do you remember what happened when winter came; how the grasshopper was forced to beg food of the provident ant? There are grasshoppers and ants among men as well as animals.

In the tropics, Nature has been kind to man and has given him an almost perpetual food supply. But in our latitude "we never get something for nothing." How many great men can you name who were born in the

tropics? Such a climate generally makes men indolent and lazy.

In the temperate zones, however, the earth produces food only a portion of the year. During the remainder of the year, man must live upon food which he has preserved or stored. One of the great advances in civilization was made when man domesticated some of the wild animals and could thus preserve food in the live state. Animal food may be preserved this way but other methods are necessary for the preservation of food plants during the winter months.

Why foods spoil. Why are special measures necessary to preserve foods? What makes them spoil? There are three families of plants which grow in living or dead material, in about the same way that other plants grow in the soil. These are yeasts, molds and bacteria. You are familiar with members of all three of these families. Yeast is used in making bread. Perhaps you did not know that it was a plant and that its growth is what makes bread rise. Mold you will recognize as the grayish, cob-web material you find on bread if kept in a warm, moist place. Bacteria makes you think of diseases. Perhaps some of you have had the opportunity to look through a microscope at some wriggling, squirming objects which were called bacteria.

Bacteria like people. Bacteria are like people; they may be either good or bad. Were it not for bacteria the clover plant could not get its nitrogen from the air. What finer example of neighborliness do we have than the clover plant and the tiny "bacteria" plants living together, one helping the other? Perhaps you did not know that all plants with which we are familiar are dependent upon bacteria for food. When a farmer

plows under a crop of corn or a dressing of farm manure, we know that it decays, that is, breaks up into simpler compounds, goes into solution in the soil water and is taken into the plant. All of this is made possible by bacteria. But let us bring the fact of the value of bacteria still closer home. When you eat your dinner, the food is digested in your stomach and intestines; part of this digestion is carried on by juices secreted there, but part of this work is carried on by bacteria.

Let us remember then that there are good and bad bacteria. Bacteria that cause disease are bad; bacteria which cause decay in the soil are good, as are those which help digest our food.

These little plants do not ask where they may grow. If we leave meat, vegetables, milk or other food exposed to the air, they will start operations.

The protection of food. How then may we protect our food from these plants? Like all other plants, they must have proper temperature, moisture, oxygen in some cases, and a suitable place in which to grow. The methods of food preservation depend upon interfering with one or more of these essential conditions to their growth. The following practical suggestions are given by McConn* for preventing the growth of molds.

1. Keep all food fairly dry.
2. Expose as much as possible to the light.
3. Lower the temperature.

Yeasts grow in food products in which the sugar content is not too high, if kept in a warm place. The spoiling of food products due to the action of yeast is

*Yeasts, Molds and Bacteria.

called fermentation. Preserves containing a high percentage of sugar do not ferment.

Bacteria a serious menace. Bacteria are more serious enemies than yeasts or molds. As has been mentioned, they are the friend of the farmer as well as of the dairyman. To them is due the flavor of butter and cheese. The housewife, however, must wage a continuous battle with them in preserving food stuffs.

One of the most wonderful things about bacteria is their power of reproduction. It is estimated that they reproduce themselves every half hour. At this rate, a single bacterium would result in the production of 17,000,000 in twelve hours. Most plants reproduce by means of seeds but bacteria reproduce by means of spores. All bacteria are killed by prolonged heating, although some species produce spores which are resistant to almost all temperatures.

Bacteria will not grow at freezing temperature or below nor usually at a boiling temperature though some species grow at 140° F. Most bacteria grow best between 70° F. and 90° F. The exact temperature at which they are killed varies with the species. What makes the bacteria difficult to kill is the fact that there are two forms, the spore form and the vegetable form. The spore form will often resist a temperature as high as boiling water. Only higher temperatures or prolonged boiling will kill some spores.

Bacteria require darkness, moisture (25-30%) and heat for best growth. Molds will grow upon acid substances but bacteria will not. This explains why fruit preserves are not attacked by bacteria. Like animals, bacteria require food containing sugars, starches, and protein.

What are ptomaines? Bacteria not only destroy

food but also form certain products which are poisonous. We call these ptomaines. Contrary to popular conception, ptomaines do not necessarily come from tin cans. They are produced by the action of bacteria on food and are probably the secretions of the bacteria.

All of this information about bacteria has been acquired by man very gradually. He soon learned to dry foods and by removing the water, to starve the bacteria, yeasts and molds. The Indians used this method in preserving buffalo and deer meat. Salting and pickling are effective methods of food preservation also. The use of drying has been developed to such an extent that now milk is evaporated and kept for some time this way.

Keeping foods cool. The spring house, cool cellar or family ice box is a short time cold storage plant where preservation is a matter of days. In the city cold storage warehouse food products can be kept for months.

The following rules should be observed in the household in preserving foods by this method:

1. Cool the food as quickly as possible. This should be done before covering and setting aside for keeping.
2. Use every possible device for avoiding moisture.
3. Use food quickly after taking it from its place of storing, for such food when warmed decays rapidly.

Canning a safe method. Preservatives are often used by commercial firms and even in households to preserve food. The use of such chemicals is dangerous and unnecessary. Food products may be canned and kept in perfect condition without their use.

Canning is comparatively a new method of food preservation. During the Napoleonic Wars, the great Napoleon, originator of that famous expression "An

army travels on its stomach," offered a prize for a method of preserving fruit and vegetables. Thereupon a Frenchman discovered "canning."

From a modest beginning canning has grown until now there are five methods known and in use, namely:

1. The open kettle or hot pack method.
2. The intermittent, or fractional sterilization method.
3. The cold water method.
4. The vacuum seal method.
5. The cold pack, single period method.

The open kettle process. In the open kettle process, the product is cooked in an open kettle, then poured into a sterilized container and sealed up. Fruits may be canned by this process but products readily attacked by bacteria cannot be preserved in this way. This is due to the fact that some air containing spores is carried in as the product is poured into the jar; another objection to this method is the overcooking of products and the resulting loss of flavor.

The intermittent method. To overcome these objections the fractional or intermittent sterilization method was devised. In this method the products were cooked in the jars or cans. It was thought necessary to repeat this operation on three successive days, sealing the jars up after each boiling; hence the name intermittent. By this method all of the spores which escaped the first boilings were eventually killed. The objections to this method were its expenditure of fuel, time and labor.

Cold water method. The cold water method succeeds quite well with such products as rhubarb and gooseberries. The jars are filled with the products and cold water and then sealed under water to pre-

vent the entrance of air. Products canned in this way require subsequent cooking and are apt to be "water-logged." The **vacuum seal** is a "short cut" cold pack method and requires special equipment. By exhausting the air in a jar by a special pump, the time required to sterilize its contents is decreased.

The cold pack method. The cold pack method used in canning factories is a marked improvement over the



13. A CANNING CLUB

first three methods. All products, except soft fruits, are subjected to a preliminary blanch or scald in boiling water or live steam and then a dip in cold water. This so-called "hot and cold dip" loosens skin, brings out color, firms the texture, removes objectionable acids and probably helps to make unnecessary the three

sterilizations of the intermittent or "three day" method. In the case of greens or "pot-herbs" it shrinks them and makes packing easier. The duration of the hot dip varies with different products. After this treatment, the products are packed in glass jars or tin cans and boiling syrup or water is added, depending upon whether fruit or vegetables are being canned. Rubbers and tops are put on glass jars and the latter screwed down, but not tight. Tin cans are sealed completely. The jars or cans are then immersed in boiling water or placed in an atmosphere of steam at a definite pressure. The time they are left in depends upon the product and the temperature. It takes less time to sterilize food products under five pounds of steam pressure than in boiling water and still less time under twenty pounds of steam pressure.

Canning outfits may be purchased, but it is possible to make a simple one which will do just as good work. A wash boiler, fifty pound lard tin, water bucket, in fact anything in which water can be boiled and to which a cover may be fitted, will do. A false bottom of wood or metal which will lift the jars from the bottom and permit the water to circulate under, around, and among the jars completes the outfit. If it be provided with handles and a guard rail, jars may be lifted in and out more easily.

Full directions for canning different products, making syrup, etc., as well as descriptions of different types of canning outfits may be obtained by requesting from the state club leader or the U. S. Department of Agriculture, Washington, D. C., the NR series of canning bulletins.

APPENDIX

A MODEL CONSTITUTION AND BY-LAWS¹

CONSTITUTION

Article I. The name of this organization shall be the.....
.....Club.

(School, township, county, etc.)

Article II. The object of this club is to increase the agricultural,
educational, and social advantages of.....
(Name of geographical unit)
through home projects, entertainments, lectures, fairs, ex-
hibits, etc.

Article III. All boys and girls living in.....
(Geographical unit)
between the ages of 10 and 18 years shall be eligible for
membership.

Article IV. Sec. 1. The officers of this club shall consist of a
president, a vice-president, a secretary, and a treasurer.

Sec. 2. A majority vote shall constitute an election.

Article V. Roberts' Rules of Order shall govern the meetings of
the club.

Article VI. The order of business for all regular meetings shall
be as follows:

1. Call to order.
2. Roll call.
3. Reading of minutes of last meeting.
4. Addition or corrections to the minutes.
5. Reports of committees.
6. Old business.
7. New business.
8. Considering new names for membership.
9. Literary program.
10. Recreation or refreshments.
11. Adjournment.

¹Credit is due Mr. E. C. Lindemann, State Club Leader of Michigan, for this material.

Article VII. Committees for special purposes may be appointed by the president at any time.

BY-LAWS

Article I. The club motto shall be "To make the B E S T, B E T-
T E R," and the club emblem shall be a four-leaf clover bearing an H on each leaf.

Article II. The officers shall be elected by ballot at the annual election in.....of each year.

Article III. The regular meeting of the club shall take place at.....on the.....
(Month)

Article IV. Sec. 1. A quorum shall consist of.....
(Name of building) (Day of the month)
(Usually two-thirds)

of the membership of the club.

Sec. 2. This constitution may be amended by a vote of.....of the members present at any regular meeting.
(Usually two-thirds)

PARLIAMENTARY PRACTICE: HINTS AND SUGGESTIONS.

a. Always address the president as Mr. or Miss President.

b. All remarks should be addressed to the president.

c. There should be no talking between members.

d. The president should recognize the person who seeks the floor by saying: "Mr. or Miss."

e. This indicates that the person thus recognized has the privilege of speaking (of the floor) and must not be interrupted.

f. The only interruptions allowable are (1) a call for a point of order, or (2) a question.

g. A point of order applies to a member who has made a motion which is out of order because of another motion before the meeting, or to a member whose remarks are not on the subject under consideration, or to a person who is exceeding the time limit for discussion, etc. A point of order is executed as follows:

Member rising while another is speaking: "Mr. President, I rise to a point of order."

The president will then recognize the speaker as follows: "Mr., please state your point of order."

Member who has interrupted speaker: "Mr. President, the speaker, Mr. is out of order because his

(Interrupted member's name)
remarks are not on the subject under consideration (or is out of order because there is another motion before the meeting)."

President: "The chair decides that the point is (or is not) well taken."

Whereupon the interrupted speaker takes his seat or makes an appeal from the decision of the chair as follows:

Interrupted speaker: "Mr. President, I appeal from the decision of the chair."

President: "Mr.....appeals from the decision of the chair. As many as are in favor of sustaining the decision of the chair will make manifest by saying 'Aye;' contrary-minded, 'No.'"

The motion is (or is not) carried.

If the motion is carried, and the decision of the chair is thus sustained, the interrupted speaker has no further recourse and must take his seat. If, however, the motion is lost and the decision of the chair is not sustained, the speaker may continue to speak.

Question. The speaker may be interrupted by any member for the purpose of asking a question. This question may be one of personal privilege or may be for the purpose of gaining information about the subject under discussion. The execution of this motion may proceed as follows:

Member taking floor while another member is speaking: "Mr. President, I rise to a question of information."

Presiding officer: "State your question."

Member: "Do I understand the speaker to mean that.....etc?"

The speaker then proceeds to give the information desired, and the meeting then proceeds.

In case of a question of personal privilege the process is as follows:

Member, rising and interrupting speaker: "Mr. President, I rise to a question of personal privilege."

Presiding officer: "State your question."

Member: "Mr. President, this room is too warm for comfort, and I therefore ask to have the windows opened."

In either case the presiding officer may rule for or against the person asking the question.

GARDEN RULES

DEPARTMENT OF THE INTERIOR
BUREAU OF EDUCATION
WASHINGTON, D. C.

1. Location. The vegetable garden should be located where the plants will receive sufficient sunlight and air.
2. Soil. The soil should be deep, rich, mellow, and well drained.
3. Seeds. Only the best vegetable seeds, purchased from reliable seedsmen, should be planted.
4. Plants. All vegetable plants, such as cabbage, lettuce, tomatoes, pepper, and eggplant, etc., should be grown, not purchased.
5. Fertilizer. Make three applications of commercial fertilizer at intervals during the growing season, rather than one application of the entire amount.
6. Cultivation. The soil between the rows should be kept well hoed. The garden should be free of weeds.
7. Intensive gardening. Use every square foot of garden space. Plant companion crops whenever possible. As soon as one crop is harvested, plant another. Eliminate all paths and weeds.
8. Harvesting. Allow no vegetable to go to waste. Can or sell what cannot be used fresh by the family.
9. Seasons. Practice all-year-round gardening.
10. Records. Accurate records of expenditures and receipts should be kept, as well as the dates of planting and of harvesting each crop.

RECOMMENDATIONS CONCERNING COMPANION
AND SUCCESSION CROPS FOR THE
HOME GARDEN

DEPARTMENT OF THE INTERIOR
BUREAU OF EDUCATION
WASHINGTON, D. C.

- I. Never choose vegetables belonging to the same plant family for either a companion or a succession crop.

The mustard family includes cabbage, cauliflower, collard, Brussels sprouts, kale, radish, turnip, and kohlrabi.

The goose foot family includes beet, Swiss chard, and spinach.

The parsley family includes carrot, celery, parsley, and parsnip.

The nightshade family includes Irish potato, tomato, eggplant, and pepper.

The gourd family includes squash, pumpkin, melon, cucumber, and watermelon.

2. Follow the quickly maturing crops of the earliest planting, such as garden peas, spinach, lettuce, and mustard, with the main crops of the second planting season, such as tomato, okra, pepper, and cucumber.

3. Follow the slowly maturing crops of the earliest planting, such as Irish potato and cabbage, with the midsummer planting of late corn, late tomato, late Irish potato, cowpeas, carrots, and beans.

4. Follow the crops of the second planting season, for example, early tomato, with the earliest fall planting season of endive, lettuce, and beets.

5. Between the rows of tall growing vegetable plants, for example, corn, plant a companion crop of any of the gourd family or any low-growing plant, the leaves of which are used for food.

6. Plant slowly maturing tall-growing vegetables between rows of quickly maturing, low-growing vegetables, for example, tomatoes between rows of carrots.

7. Choose a succession crop that will require the same amount of space as the crop just harvested, or plan the garden so that one row of Irish potatoes, for example, may follow two rows of lettuce.

8. The entire vegetable garden should be deeply spaded and well fertilized before the planting of the earliest crops in the spring.

LIST OF HOME GARDENING PUBLICATIONS

The following publications have been prepared to assist teachers who are conducting school-home gardening. They may be obtained by applying to the United States Bureau of Education.

Circulars

1. Instruction for school supervised home gardens.
2. A course in vegetable gardening for teachers.

3. The winter vegetable garden.
4. Organic matter for the home garden.
5. Hot-beds and cold frames for home gardens.
6. Raising vegetable plants from seed.
7. How to make the garden soil more productive.
8. Planting the garden.
9. Part played by the leaf in the production of a crop.
10. A suggestive schedule for home garden work in the South.
11. List of publications for the use of school-home garden teachers.
12. School-home garden results of 1916.
13. Garden projects in seed planting.
14. Flower growing for school children in the elementary grades.
15. Part played by the roots in the production of a crop.
16. Home gardening for town children.

Chapter 15. Commissioner of Education. Report for 1916.
(Reprinted.)

Daily Record Books of boys' and girls' home gardens.

Letters

1. The home garden; its economic value and its relation to the school in towns and cities.
2. Summary of recommendations of the United States Bureau of Education concerning school and home gardening.
3. Outline for studying vegetables.
4. List of home gardening circulars and letters.
5. Outline for home work in school-directed home gardens in the South.

Bulletin

1916. No. 40. Gardening in elementary city schools.

SOME GARDEN BOOKS

- Productive Vegetable Gardening—Lloyd.
Market Gardening—Yeaw.
Manual of Gardening—Bailey.
School Gardens—Hood.

The Project Notebook

VEGETABLE GARDENING AND CANNING

Year.....

Name

Address

Name of Club.....

School Dist. No.....

Teacher

Club Leader

The student is urged to answer all questions, describe all operations called for in the monthly calendar, and make all records in the proper place in this notebook.

THE PLAN OF THE GARDEN

Make the plan of your garden drawn to scale on this page. Draw first with pencil, and at the end of the season retrace the lines with ink.

EXPENSES
RECORD OF WORK

69

Keep a record of all time spent at work in the garden. Begin this record with preparation of seed bed and include time spent in gathering products.

If only a few minutes are spent in the garden at a time, make record in fraction of hour.

EXPENSES
RECORD OF WORK

EXPENSES

71

RECORD OF WORK

EXPENSES
RECORD OF WORK

Record should be made here of all seeds and plants purchased for the garden--also tools, stakes, spraying mixtures, fertilizers, etc.

Charge $\frac{1}{6}$ of the cost of all permanent equipment.

Rent of garden plat shall be estimated at 5% on a fair selling valuation per acre. This item shall be counted in with expense even if no direct rent is paid.

Bent

Size of my garden.....sq. ft. or rods
Estimated rent for 1 acre \$.
Estimated rent for my garden \$.

RECEIPTS

FRESH VEGETABLES USED AT HOME

Record shall be made here of all fresh vegetables from garden used at home and also vegetables given away.

The local club leader will determine method of weight or measure and also price of vegetables.

Where there is no club leader, cost of products will be determined by that in local markets.

RECEIPTS

75

FRESH VEGETABLES USED AT HOME

RECEIPTS

FRESH VEGETABLES USED AT HOME

RECEIPTS

77

FRESH VEGETABLES USED AT HOME

When vegetables are sold outside the home, careful measure should be made and record kept of quantity sold and money received.

FRESH VEGETABLES SOLD

79

FRESH VEGETABLES SOLD

FRESH VEGETABLES SOLD

81

FRESH VEGETABLES SOLD

FRESH VEGETABLES SOLD

83

With the exception of such vegetables as radishes and lettuce, all others not used as fresh vegetables should be canned. Value of vegetables for home use shall be determined by market value of such product.

Vegetables may be canned for market in either glass jars or tin cans. 4-H brand labels may be purchased by members who can products according to government instructions.

Keep record of canned vegetables sold here.

VEGETABLES CANNED FOR MARKET

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SUMMARY**EXPENSES**

Hired Labor @ 17c per hour.....	\$.....
Horse Labor @ 10c per hour.....	\$.....
Supplies	\$.....
Rent	\$.....
Total Expenses	\$.....

RECEIPTS

Vegetables Sold	\$.....
Vegetables Used at Home.....	\$.....
Vegetables Canned for Home and Market	\$.....
Equipment on Hand.....	\$.....
Total Receipts	\$.....
(Subtract) Expense \$.....	
Labor Income	
(Subtract) Labor at 10c per hour.....	
Profit or Loss \$.....	
Profit per 100 sq. ft.....	
or Profit per 1 sq. rd.....	

If your state has a different form for recording the Garden and Canning Project, to be sent to the state leader, it may be made out from the records and data here kept by the pupil. The Bureau of Education, Washington, D. C., has issued a very excellent Daily Record Book for Boys' and Girls' Home Gardens.

The club leader shall sign here each time a visit is made to your garden.

Other friends who visit the garden may also sign their names here.

GARDEN VISITORS

